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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/624,316	07/21/2003	Rajesh Menon	MIT.9922	7282

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Samuels, Gauthier & Stevens LLP
Suite 330
225 Franklin Street
Boston, MA 02110

EXAMINER	
BERMAN, JACK I	

ART UNIT	PAPER NUMBER
2881	

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Please find below and/or attached an Office communication concerning this application or proceeding.

H·A

Office Action Summary	Application No.	Applicant(s)	
	10/624,316	MENON ET AL.	
	Examiner	Art Unit	
	Jack I. Berman	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *14* is/are allowed.

6)☒ Claim(s) *1-8,11,12* is/are rejected.

7)☒ Claim(s) *9,10 and 13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/7/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 11 and 12 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a maskless lithography system comprising an array of apodized diffractive elements that have a focusing efficiency of at least 50% or alternating phase photon sieves that have a focusing efficiency of at least 50% and are 100% transmissive, does not reasonably provide enablement for a maskless lithography system comprising any other type of array of diffractive elements that have the claimed focusing efficiency and transmissivity. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. In Figure 10 and the related discussion in the specification, the instant application discloses that apodized zone plates can have focusing efficiencies of at least 50% and beginning on page 16 the specification discloses that alternating phase photon sieves can also have high focusing efficiencies, but there is nothing to establish that no other type of diffractive elements can have focusing efficiencies this high. Any person having ordinary skill in the art attempting to make the claimed invention using any type of diffractive elements other than apodized zone plates or alternating phase photon sieves would have to make these elements with no guidance from the disclosure of the application and then test them to measure their focusing efficiencies. This would constitute an undue amount of experimentation. Similarly, attempting to make the invention claimed in Claim 12 would have to perform an undue amount of experimentation to make diffractive elements other than alternating phase photon sieves that are 100% transmissive.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Raj for the reasons explained in the previous Office action.

Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith, Raj, and Johnson for the reasons explained in the previous Office action.

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith, Raj, Johnson, and Kipp et al. for the reasons explained in the previous Office action.

Claims 9, 10, and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 14 is allowed.

The following is a statement of reasons for the indication of allowable subject matter: Phase photon sieves are not disclosed in the prior art; and while Bessel zone plates are known in the art, there is no suggestion in the prior art to use them to convert an energy beam into an array of Bessel beams in a maskless lithography system to create a permanent pattern on an adjacent substrate.

Applicant's arguments filed November 17, 2004 have been fully considered but they are not persuasive. With regard to the rejection of claims 11 and 12 under 35 USC 112, first paragraph, as not being commensurate with the scope of the disclosed invention, applicant argues that as long as at least one example of a system as claimed in each of claims 11 and 12 is enabled, the claims meet the requirements of 35 USC 112. This position is at odds with the position of the Court of Appeals for the Federal Circuit. Section 2164.08 of the Manual of Patent Examining Procedure reads (on page 2100-191):

> The Federal Circuit has repeatedly held that "the specification must teach those skilled in the art how to make and use the full scope of the claimed invention without 'undue experimentation'." *In re Wright*, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993).

In this case, the BACKGROUND OF THE INVENTION section of the specification states (on page 2 of the specification):

> Although such diffractive focusing elements may be used in lithography systems employing radiation other than x-rays, amplitude Fresnel zone plates typically provide an efficiency of focusing incident radiation into the first-order focus of approximately 10%, while Fresnel phase plates typically provide an efficiency of focusing into the first-order focus of approximately 40%. Higher efficiencies are highly desirable for most lithographic applications. Moreover, some applications, such as the focusing of pure x-ray wavelengths, are not possible using only Fresnel phase plates, requiring the use of mixed Fresnel zone plates.

> There remains a need therefore, for a diffractive focusing system that may be used more efficiently and economically in a maskless lithography system.

Since it is applicant's position that a diffractive focusing system having a focusing efficiency of at least 50% is an unmet need in the art, then any such diffractive focusing system other than the systems specifically disclosed in the specification would require undue experimentation. If the amount of experimentation required to develop such a system were routine, then there would be no unmet need for the instant invention to meet. As for applicant's assertion that the indicated allowability of claim 13, which depends from both claim 12 and claim 11, is inconsistent with the rejection of claims 11 and 12 under 35 USC 112, first paragraph, applicant is mistaken. Unlike parent claims 11 and 12, claim 13 meets the requirements of 112 because it narrows the scope of the claim to a scope that is commensurate with the disclosed invention.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the examiner explained in the previous Office action why it would have been obvious to a person having ordinary skill in the art to apply the teachings of Raj to the Smith maskless lithography system by forming each of the facets of the Fresnel zone plate as a blazed Fresnel zone plate in order to reduce distortions in the Fresnel zone plates, to apply the teachings of Johnson to the Smith/Raj apparatus discussed above in order to reduce distortion in the

manner taught by Johnson, and that Since Kipp et al. discloses amplitude photon sieves and teaches that they are functionally equivalent to Fresnel zone plates, the use of such photon sieves instead of the Fresnel zone plates used in the Smith/Raj/Johnson apparatus discussed above would have been an obvious substitution of known equivalents. Also, applicant is incorrect in stating that the Johnson reference does not disclose apodized diffractive elements as required by claim 3. As the examiner pointed out in the previous Office action, Johnson teaches, at lines 34-52 in column 11, to reduce distortion in a maskless lithography system using an array of microlenses by apodizing each microlens aperture.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack I. Berman whose telephone number is (571) 272-2468. The examiner can normally be reached on M-F (8:30-6:00) with every second Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jack I. Berman
Primary Examiner
Art Unit 2881

jb
1/25/05